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AUTHOR Nelson, Adam; Harvey, Francis
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ABSTRACT

A qualitative study of an intensive week-long adult-training course taught with integrated hypermedia was conducted to document course implementation and to formulate questions and hypotheses about aspects of learning with hypermedia to guide future researchers. The hypermedia training was that of the Cities in Schools (CIS) Program Operations training, a management-training course for directors of CIS dropout-prevention programs. A qualitative observational data method was used, with observations recorded throughout the week-long training. Questions that further study may address are: (1) diversity of learners; (2) pairing learners; (3) introduction of participants; (4) objectives and evaluation; (5) course evaluation forms; (6) action plans; (7) trainer-developed activities; (8) supplemental learning materials; (9) entertaining activities and videos; (10) use of print resources; (11) hypermedia and trainer predilection; (12) time management; and (13) process checks. One table gives a taxonomy of the observation types. (Contains 14 references.) (SLD)

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Title:

Qualitative Evaluation of an Integrated Hypermedia Training Environment

Authors:

Adam Nelson
Francis Harvey

Lehigh University
Bethlehem, PA 18015

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Introduction

Purpose of the Study

The researchers examined an intensive, week-long, adult training course which was taught with an integrated hypermedia curriculum. Trainees' and trainers' use of the hypermedia training materials, as well as interactions among participants (on-task and off-task, during training sessions, and during evening social activities) were recorded and examined.

There were two main goals of this research: To document in detail how the hypermedia course was implemented, and to formulate questions and hypotheses about aspects of learning with hypermedia which may guide future researchers.

Outcomes of the Study

A comprehensive research report now being written will describe the interactions which took place during the training course in order to convey the experience of a participant in this hypermedia training environment. Cates (1985) stated that descriptive studies of this type supply information which "contributes to the theoretical understanding of the ways in which individuals, groups, and situations operate" (p. 95). This paper identifies some questions and proposes hypotheses about teaching and learning with hypermedia which may be of interest for closer examination in future studies. Due to the constraints of this forum, it summarizes only briefly the interactions which took place during the training course.

Aspects of The Learning Environment

Overview

The hypermedia training environment evaluated was that of Cities in Schools (CIS) Program Operations training. This is a management training course for Executive Directors of local city-wide or county-wide CIS dropout prevention programs. The training is carried out at the National Center for Partnership Development (NCPD) at Lehigh University's College of Education in Bethlehem, Pennsylvania. It is managed and taught by CIS trainers utilizing an integrated hypermedia curriculum which was developed at Lehigh's Advanced Information Technologies Laboratory. The course is typically offered every other month throughout the year, and is one of a number of courses offered by CIS at the NCPD, and at CIS's five regional offices.

Cities in Schools

Cities in Schools is the nation's most comprehensive dropout prevention program. Locally-funded, not-for-profit CIS programs address the varied needs of at-risk youth and their families by coordinating existing human services resources, and by repositioning service providers into schools to work alongside teachers and other school staff. Cities in Schools, Inc., through its national and regional offices and the NCPD, provides training and technical assistance to help local groups of concerned people to replicate and operate CIS programs in their communities.

Advanced Information Technologies Laboratory(AITL). Faculty and staff of Lehigh's AITL have developed an extensive integrated hypermedia curriculum for CIS (Harvey, 1993; Harvey & Story, 1990). The hypermedia developed for Cities in Schools consists of cross-linked computer, video, and text-based materials as well as suggested implementation and evaluation strategies for trainers. The computer-based textual and graphical resources refer users to related pages in print manuals, control a videodisc player, and prescribe specific learning activities. Trainers may follow the suggested implementation plans, which are

referred to as learning strategies, or they can formulate their own strategies to suit their needs or predilections (Harvey, 1993, 1993a).

Program Operations Hypermedia Training

The CIS Program Operations course, a week-long, full-day course for CIS personnel who direct a city's or county's CIS program, was the focus of this study. The Macintosh computer software portion of the CIS Program Operations hypermedia training course contains over 2500 different information and activity screens. It accesses segments of full-motion video and still video slides from a two-sided videodisc.

The print-based portion encompasses over 2000 pages, in three separate manuals. The Trainee's Resource Book contains print-based learning resources and activity sheets. The Trainer's Manual contains all the resources of the Trainee's Resource Book, as well as the specific objectives, suggested learning strategies, activities, and evaluation strategies for each of the 127 learning sub-activities which make up the 32 learning activities. The Monroe City Casebook contains the print-based resources related to a simulation which is embedded in the hypermedia and integrated into many of the learning activities.

The training is organized into 32 learning activities. Each is composed of three or more learning sub-activities (LSA's); at least one at each of three levels of learning specified by Harvey's (1993) learning model:

Information acquisition/comprehension, wherein trainees participate in activities which help them learn background and prerequisite information and skills;

analysis/synthesis and application in a controlled setting, which affords trainees opportunities to apply their knowledge and skills to solving problems in a simulated scenario; and

action plan level, which is the trainees' opportunity to apply their new knowledge and skills to planning activities and improvements to be implemented on return to their home setting.

Each LSA in the hypermedia is designed as a complete learning unit. It is focused on the achievement of a specific performance objective. It describes activities for trainees to participate in, provides learning resources to use, and specifies performance criteria and evaluation strategies for trainers to use when assessing student learning (Harvey, 1993).

The training course. The five-day-long training course is organized by CIS trainers who select parts of the curriculum which they have identified through a pre-training questionnaire as most requested for each particular group of trainees.

The trainers. Trainers are selected from Cities in Schools, Inc.'s staff of regional trainers who normally work at the five regional offices. They are chosen by CIS' training coordinator, based at Lehigh University, in consultation with CIS' Vice-President for Training. There are usually three or four trainers including the training coordinator, for a group of anywhere from ten to fifteen trainees. Each trainer is assigned specific learning activities to teach by the training coordinator. Teaching style is left up to the individual trainer's predilections and judgment. They are free to follow the learning strategies contained in the hypermedia, or not to.

The Setting

The National Center for Partnership Development (NCPD) is a training facility created and maintained by a partnership of Cities in Schools, Inc., Lehigh University's College of Education, and Lehigh's Iacocca Institute. The objective of the NCPD is to utilize advanced technologies to assist learning and to spread the knowledge and skills needed by people from a variety of sources and organizations, and by all members of the Cities in

Schools family in particular. The NCPD facility is located at Lehigh University's Mountaintop Campus in Bethlehem, Pennsylvania. The facility is composed of a large training room containing twelve Apple Macintosh IIci computer workstations with videodisc capability. The workstations are located around the periphery of the room. A trainer's station is situated at one end of the room with the capability to project its computer display and video for large group viewing, and a central, semi-circular table is provided for group discussions and activities.

Subjects

The trainees. People who attend Program Operations training at Lehigh's NCPD are social service or school administrators, Executive Directors or board members of local Cities in Schools programs, and occasionally people from organizations other than Cities in Schools. Most have been hired by a local CIS program's board of directors to organize, set up, or manage the community's CIS program. In the past, trainees have come to Lehigh for Program Operations training from all areas of the United States and from England, Canada, and South Africa. They usually include members of several cultures, races, and backgrounds, and most have attended college. All are people who want to help children to succeed. Some have worked for social services agencies, and some have worked for local Cities in Schools programs in various capacities.

The training group. Each group of ten to fifteen CIS Program Operations trainees is composed differently and has different interactions. The group of trainees who participated in the training course examined was made up of one or two people from each of several of different states, and a small group from a single state, most of whom were unacquainted.

Method

Overview

The method applied in this study was developed for the purpose of gaining an accurate image of the occurrences which take place during a Cities in Schools Program Operations training course. The objective was to construct a methodology which would allow the researchers to gain as full an understanding of the experiences of a participant as possible, while changing the environment as little as possible. A major constraint on the prospective methodology was that the researchers could not interfere with or change the training program. The researchers determined that the goals of the research and the constraints imposed by the setting could best be accommodated by the application of a qualitative, observational data collection method. Preliminary data collected in two pilot studies validated and refined the method which was to be applied in this study.

Non-Participant Observation

The data collection method consisted of the systematic observation of a week-long training course using a method which is applied by many researchers in the social sciences (Delamont, 1992; Miles & Huberman, 1984). Observations were recorded in brief descriptions and were later expanded at the earliest possible time. When some volume of data had been collected, the data were examined in an attempt to identify explanations for unusual or unfamiliar patterns or events. Initial interpretations derived from this analysis were then reexamined as other data are collected to test their accuracy. Many of these initial interpretations needed some refinement, and some proved to be completely inaccurate.

Interview. In addition to observing passively, subjects were interviewed on specific topics at appropriate times that did not interfere with or interrupt training activities (e.g. at

dinner, or on a break). The subjects were asked questions in order to test the validity of preliminary interpretations he had made.

End of course reaction forms. Although end of course reaction forms are discouraged as an evaluation method by a number of educational researchers (Dixon, 1987; Jones, 1990), they are still widely used in corporate management training programs and many other training programs. Put in the proper perspective, they may have some value as one aspect of a larger evaluation methodology (Ban & Faerman, 1990; Clegg, 1987). In the Program Operations course, the extent of formal course evaluation being done by CIS's trainers was collection of these end of course reactions, and compilation of the responses. Since these were already a part of the learning experience, the resultant data were examined, and considered when forming interpretations and drawing conclusions.

Data collected. Categories of interactions which were recorded concerned the ways in which the hypermedia course was implemented, and the other activities which were facilitated by the trainers. These categories were developed by the application of this methodology in the pilot studies which were conducted during training courses held in July, 1992, and in May, 1993 (Nelson, 1993, 1993a). The time that each observation was made was recorded, so that the duration of each interaction could be calculated. Observations made included detailed information on the content and context of interactions, including the "ecology" of the situation (lighting, heat, location and movement of participants in the room, and other aspects of the situation which may have influenced the interactions), and concerned the categories listed in Table 1.

Table 1
Taxonomy of Observation Types

Individual activities
- Individual work with computer-based hypermedia materials
- Individual reading information from print-based hypermedia materials
- Individual presents to a small group
- Individual presents to the class
- Other individual activity

Small-group activities
- Small-group work with computer-based hypermedia materials
- Small-group reading information from print-based hypermedia materials
- Small-group presents to the class
- Other small-group activity

Trainer-led activities
- Large-group discussion
- Trainer providing help to individual or small-group
- Trainer asking question of individual or the group
- Trainer presenting objective(s) to the group
- Trainer presenting information to the group
- Trainer presenting to group with non-hypermedia transparency
- Trainer presenting to group with flip chart
- Trainer directing trainees to read print-based hypermedia resource(s)
- Trainer presenting hypermedia to group with LCD panel
- Trainer playing hypermedia video segment for the group
- Trainer playing non-hypermedia video tape for the group

Other observations and data
- "Ecology" of the situation (lighting, heat, location and movement of participants in

the room, and any other aspects of the situation which may influence the interactions)
Trainees taking a break
Trainers' and trainees' comments
Other interactions and activities

Responses to questions

Questions asked
Trainers' or trainees' answers
Questions asked by trainees (and answers given)

Throughout each day of training, objective observations and perceptions were recorded. At the end of each day, the data were classified into categories which helped to organize and group related data to assist in analysis. An audio tape recorder was used to provide a more detailed record of some group learning activities, and to record comments and suggestions made during "process checks" (i.e. the last activity of each day, during which participants discuss the day's activities and suggest ways to improve the training).

Duration of The Study

Anthropological studies frequently involve a long-term immersion in a culture under study. Field work lasting one to two years is not unusual. In the field of educational research, research projects of this length are impractical. Educational researchers must deal with problems such as access to subjects, life cycles of innovations under study, and insufficient funding. Educational researchers must do more concise, focused studies (Tucker & Dempsey, 1991). As MacDonald (1981) stated, "We go for condensed field work, short, sharp bursts of data gathering leading to negotiated accounts of social action in situ" (p. 4).

Prior to conducting this study, the authors examined two other week-long training courses . For the purposes of this examination of training, the duration of the data collection phase comprised a five-day period. This was the total time that trainees had contact with trainers in the hypermedia course. The life cycle of the course, and of the training group (trainers and trainees), was limited to these five days, after which the group disbanded, likely never to reconvene in the same combination. Although some of the trainees had attended other training courses, each Cities in Schools Program Operations training course is comprised of trainees who likely have never met each other or their trainers, and each course is unique in content and personalities. Data were collected throughout the training day, and at evening functions, lunches, and breaks.

Results

Overview

The results of this research are currently being developed. The authors expect this phase of the study to be completed by the end of March, 1994. Some preliminary results are presented herein, which may guide others planning research in this area.

Written Description

The constraints imposed by this forum restrict the researchers from providing a complete written description of the week-long Program Operations course. The final report of this study will include a detailed, textual description and other representations of the events of this week-long course. This paper includes a report of the aspects of this training

course which appeared to warrant further investigation. These aspects were related to a number of general areas.

The diversity of the trainees participating in the course was extreme. some had held their positions with CIS for several years, others had been hired only weeks or days prior to the course. Still others weren't even CIS employees. Trainees came to the course with vastly different knowledge, experiences, skills, and needs.

This variety, and the fact that some trainees worked in pairs, and others individually, raised questions about the pairing or grouping of learners. It was observed that those who worked in pairs displayed a far greater number of interpersonal interactions than people working individually, that they frequently answered each other's questions and discussed the content of learning materials, and that excepting one person, they participated a great deal in large group discussions. This aspect of learning with hypermedia needs to be researched in more depth because, of the thirteen trainees in this course, only four worked in cooperative pairs, and their groupings were voluntary.

presented to trainees. Comments and questions which arose indicated that the purpose of lessons was not always made clear to the learners. It is the authors' contention that learners would be more likely to achieve the objective(s) of any lesson if they were overtly presented in advance.

Evaluation of the attainment of individual objectives was conducted by trainers in this course without the aid of formal tools. Trainers analyzed the responses of trainees during large group discussions and other group activities. It was therefore impossible for the trainers to assess objective attainment for each trainee, but only to infer that if one or more trainees displayed objective attainment, that all had probably achieved the objective(s) of the learning activity.

The culminating activity of every suggested learning strategy prescribed by the hypermedia curriculum used in this course is the development of an action plan by each trainee. This was described to trainees as the writing of a plan for implementing the knowledge and skills they gained in the course. It was to be a detailed list of things to do and investigate upon return to their CIS programs. It was observed however, that after the first day, this activity was rarely mentioned, and was skipped over, in spite of the fact that it was scheduled on the course agenda. On two days, trainees were dismissed early, despite the fact that this scheduled activity was being passed over.

Although the hypermedia curriculum used in this course prescribed specific learning strategies for trainers to facilitate, the trainers often implemented activities of their own design. When questioned, they reported that the objectives were those listed in the hypermedia learning activities, but that they had developed activities which combined a number of the objectives in order to cover more content in the time available.

Some of the trainer-developed activities involved the use of learning resources which trainers had developed in order to supplement those available in the hypermedia. These varied in content and quality.

After activities which prescribed trainees' use of the hypermedia resources, trainers commented to each other that they had noticed little or no use of print-based resources by the trainees. Although they had observed this, and expressed that they felt it was a problem, they did not instruct the trainees to more fully utilize these resources.

It has been concluded that trainers' predilections are an extremely important factor in determining resource utilization and learning of trainees. The instructions given, information resources examined, and activities carried out are directly related to each trainer's favored teaching style. Some trainers use hypermedia as an integrated part of the learning activities they facilitate. Others use it as an information database, to provide rapid access to information for display to a group. Trainers who teach in this way use hypermedia much like an electronic flip chart or overhead transparency. When they allow trainees to

access hypermedia, it is frequently in a manner similar to the way they might have used printed trainee manuals in the past. Still others avoid its use, preferring more traditional, trainer presentation teaching strategies. In the course studied, each trainer utilized hypermedia in different ways. They varied their teaching and presentation styles, and did not seem to display a clear preference for one particular mode of teaching.

Time management appeared to be difficult during this course. Several times throughout the week, the course agenda was revised to accommodate activities that took longer or shorter than predicted. Thursday's agenda was changed to reflect the trainees' needs with regard to completing an out-of-class assignment, then trainees were released from class early, despite the fact that they had not worked on action plan development, which was on the agenda. Management of the duration of breaks also seemed to be difficult in this course. Many times, when trainees were allotted a specific amount of time for a break, they didn't reconvene until the trainers called them back, often long after the allotted time had expired.

At the end of each day of this course, the trainers conducted what they called a "process check." This was their way of evaluating that day's activities, and allowing trainees to comment and offer suggestions for improving the activities. It seemed that this would have been an ideal time for trainees to rate the relevant activities using their reaction forms, as they had been instructed to do on the first day.

On Monday, the trainees had been told to rate each day's activities on the same night, so that their thoughts and reactions would not be forgotten. Trainers did not remind them to do so however, so the trainees completed the Likert-type reaction forms when the course was finished.

Questions and Hypotheses

Developing questions and hypotheses about teaching and learning with hypermedia was the major projected outcome of this study. Because the use of hypermedia as an instructional tool is so new, little research has been done regarding the ways that it can best be employed for this purpose. Some of the unique attributes of hypermedia afford users new ways to teach and to learn. It may be that old paradigms of teaching and of learning will need to be changed to most efficaciously utilize hypermedia.

The questions and hypotheses which follow have been derived by examining the occurrences of a Cities in Schools Program Operations training course held November 8 through 12, 1993, and by comparing that data set to the occurrences during two pilot studies (Nelson, 1993, 1993a). They are related to the observations presented above, and concern a number of aspects of the use of hypermedia as a learning tool.

Diversity of Trainees

Hypothesis 1: There will be no significant difference in achievement based on trainees' pre-existing levels of experience or knowledge in hypermedia training courses which include people possessing various levels of experience or knowledge of the subject matter .

Pairing Learners

Hypothesis 2: There will be no significant difference in achievement of course objectives, learning efficiency, retention of course content, or post-training job performance for trainees learning with hypermedia in cooperative pairs or those working individually.

Hypothesis 3: There will be no significant difference in the number of requests for trainer assistance related to course content or to the use of hypermedia from trainees learning with hypermedia in cooperative pairs or those working individually.

Hypothesis 4: There will be no difference in the action plans developed by trainees learning with hypermedia in pairs, and those of trainees who work individually.

Introduction of the Participants

Question 1: What effects on the outcomes or objective attainment of trainees working with hypermedia do trainer's instruction have?

Objectives and Evaluation

Question 2: Are objectives for hypermedia courses that are developed by practicing professionals valid?

Question 3: What is the effect on post-training job performance of teaching practical information-retrieval skills, rather than teaching specific information?

Hypothesis 5: Trainers will more consistently implement learning activities designed to expose trainees to content in a shorter time than those that take longer to implement, regardless of the potential learning outcomes.

Hypothesis 6: Trainees will demonstrate no significant difference in objective achievement, retention of content, or training-related job performance if the objectives of a hypermedia learning activity are presented to them, or not.

Hypothesis 7: Trainers will evaluate the objective attainment of trainees in a hypermedia-assisted course if they are provided with easily-applied measures.

Hypothesis 8: When used as an information resource, an indexed hypermedia structure facilitates more efficient information retrieval than does a hierarchical, activity-oriented structure.

Hypothesis 9: There is no correlation between one or more trainees demonstrating achievement of the objective(s) of a hypermedia learning activity in a group discussion, and objective attainment by other trainees in the group.

Course Evaluation Forms

Question 4: If evaluation forms were completed after each hypermedia learning activity, rather than at the end of a course, would the ratings or comments be different?

Question 5: What is the correlation between the trainees' ratings of a hypermedia activity, and objective attainment, content retention, or successful post-training application?

Question 6: When designing or modifying hypermedia learning activities, do trainers formulate a lesson plan which includes one or more objectives and evaluation strategies?

Hypothesis 10: A course evaluation which included the objectives which were to be achieved would yield significantly different responses than a simple, Likert-type reaction form.

Action Plans

Question 7: Is the development of an action plan in a hypermedia-assisted course correlated to increased retention or application of learned skills and/or information?

Question 8: Why was little emphasis placed on the development of a plan for implementing the skills and knowledge gained in this hypermedia-assisted course, even though trainers had earlier stressed the importance of such a plan?

Question 9: Why are trainers reluctant to point out problems they have noticed in each other's hypermedia learning activities or in trainees' performance?

Trainer-Developed Activities

Question 1: What effects on the learning outcomes or objective attainment of trainees do trainer's instructions have?

Question 10: Do activities which are less-than-directly related to achieving the objectives of

training, but which trainees enjoy, effective or valuable parts of a hypermedia training course?
Hypothesis 11: There will be no significant difference in trainees' objective achievement from hypermedia learning activities whether they are assisted in locating relevant information, or not.
Hypothesis 12: Trainees are no more likely to achieve the objectives of a hypermedia learning activity when objectives are overtly stated, than when they are not.
Hypothesis 13: Trainers will cover less content, albeit more thoroughly, in a hypermedia course which is to be evaluated based upon trainees' objective attainment, than in one which utilizes "smile sheets" (i.e. Likert-type reaction forms) for evaluation.
Hypothesis 14: Trainers who are thoroughly familiar with the resources available in a hypermedia curriculum are no more likely to integrate their use into learning activities, than trainers who are not.

Supplemental Learning Materials
Hypothesis 15: There will be no significant difference in learner achievement between a course which is taught with the aid of projected hypermedia resources and a comparable course taught with hand-drawn transparencies.
Hypothesis 16: In a course which is chiefly taught using computer-generated teaching aids, the incongruity of hand-drawn teaching aids distracts learners, resulting in inferior learning of the content of those resources.

Entertaining Activities and Video Tapes
Hypothesis 17: There will be no significant difference in objective achievement by trainees in a hypermedia course which follows lesson plans to the letter, or in a course which includes entertaining asides and activities.
Hypothesis 18: Short, entertaining asides help trainers to gain and hold trainees' attention, thereby leading to more effective learning.

Poor Use of Print Resources
Question 11: Do trainees prefer to use computer and video-based hypermedia resources rather than print-based resources?
Hypothesis 19: The use of print-based hypermedia resources in addition to computer and video-based resources does not significantly increase learning, retention, or post-training application.

Hypermedia and Trainers' Predilections
Hypothesis 20: A single training course in the use of hypermedia for teaching is insufficient to change trainers' normal patterns of behavior.
Hypothesis 21: There is no significant difference in trainees' objective achievement between those taught with a hypermedia curriculum, and those taught using more traditional, trainer presentation strategies.
Hypothesis 22: Objective achievement when learning with hypermedia is not significantly different when the hypermedia is used in a group setting which allows for interpersonal interaction, or in an individualized setting without human interaction.
Hypothesis 23: The provision of sample forms, plans, or other materials, which demonstrate how others have applied the content of a hypermedia course, will result in increased post-training application of skills and knowledge.

Time Management

hypothesis 24: There will be no significant difference in information retention or training-related job performance among trainees participating in a hypermedia course which covers more content, and one which covers less content in more depth.

Question 12: When a number of hypermedia learning activities are grouped and taught together, are all the objectives achieved?

Question 13: Is there any affect on trainees' attitudes in a hypermedia course, when trainers allow breaks to run longer than scheduled?

Process Checks

Question 14: Do trainers change their lessons or hypermedia learning activities in future courses that they facilitate, based on previous trainees' comments?

Discussion

These questions and hypotheses have been developed by examination of the data collected during the November 8 - 12, 1993 Program Operations course, and by comparison with data collected during two other Cities in Schools training courses. A full description of the week-long course, a breakdown of each activity by time, and support for the questions and hypotheses developed will be included in the final report of this study which the researchers expect to complete by the end of March, 1994.

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